

# NISTTech

## Imaging Deblurring Method

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**Using singular integral operators and Fast Fourier Transform (FFT) algorithms**

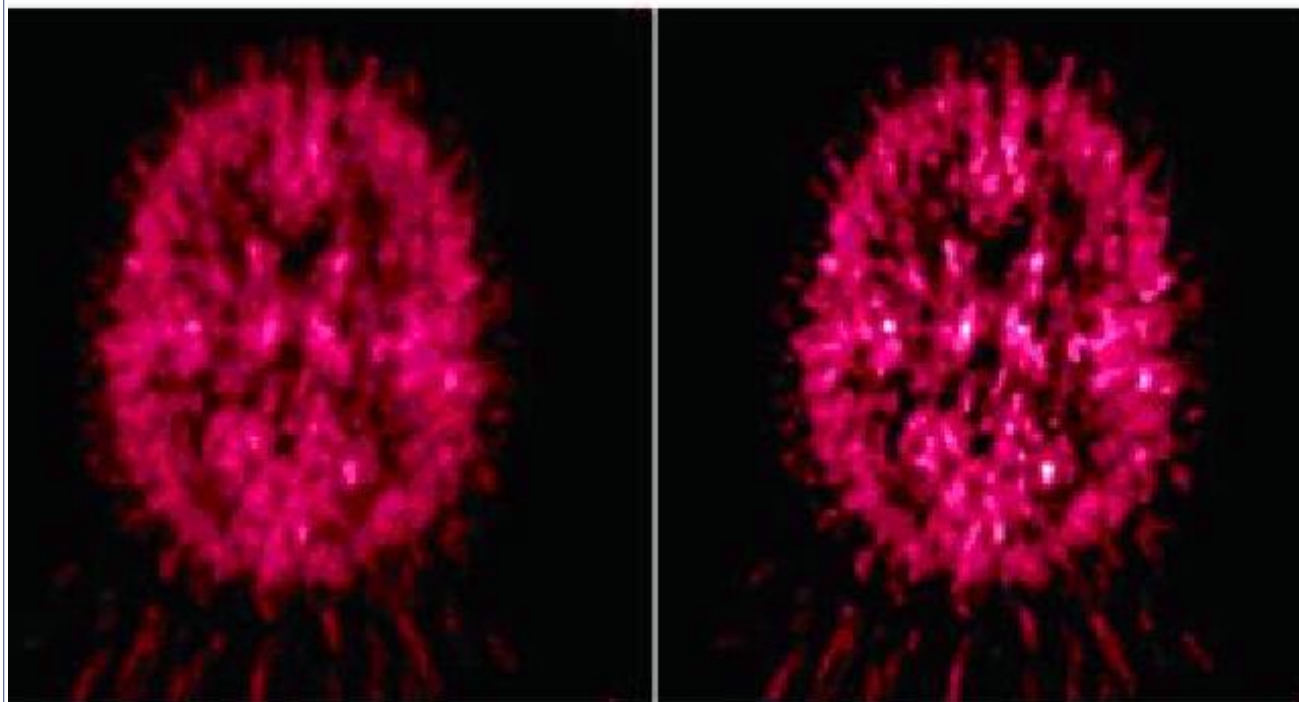
### Description

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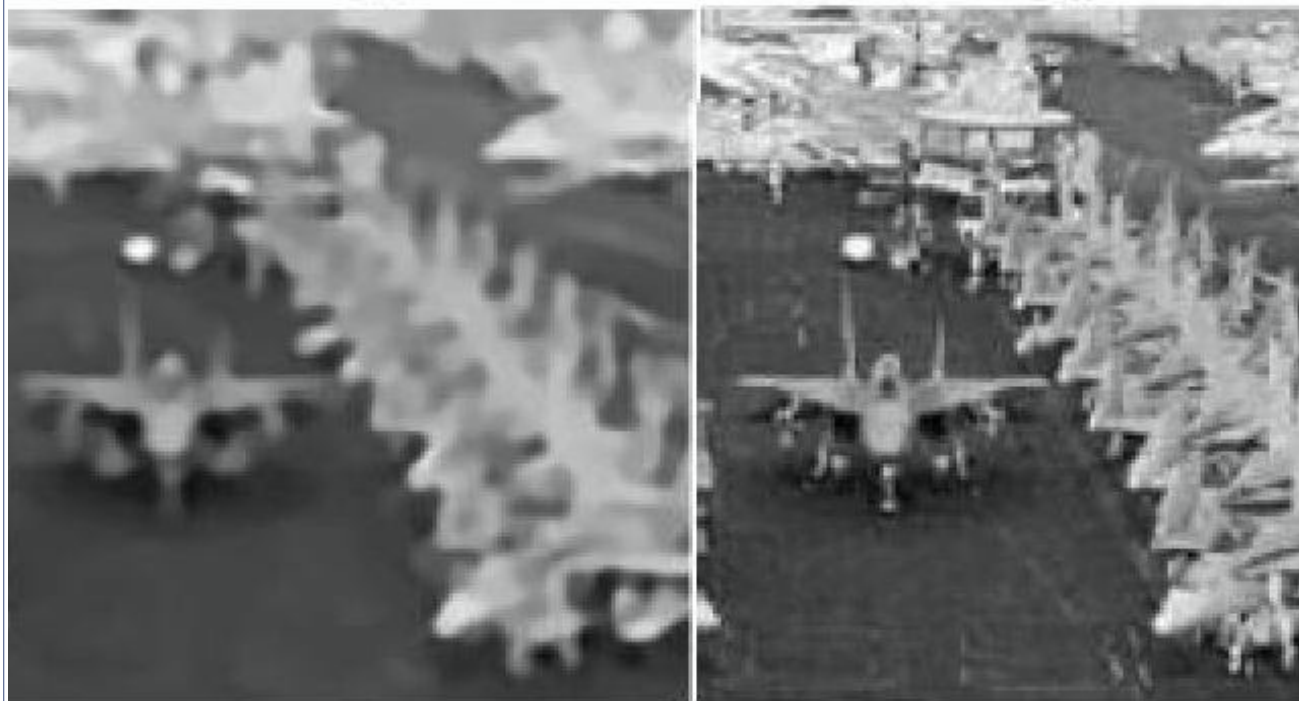
This method of real-time image deblurring is based on singular integral operators and fast-Fourier transform algorithms. NIST's Singular Integral method is applicable to medical imaging where deblurring techniques are required to clearly see and identify fine-scale structures. Other available total variation methods and deblurring methods smooth over irregularities and variations, which could result in missing or misdiagnosing a dangerous feature in medical imaging applications. The Singular Integral method instead accurately picks up fine-scale structures. Deblurring is likewise critical to deciphering images in homeland security and remote sensing (agriculture, exploratory, inspection and mapping) applications. This method could be packaged as software and marketed as an add-on to augment the capability of imaging systems (medical scanners, microscopes in all varieties, cameras and telescopes).

### Images

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PET Image Before/After Deblurring



Aircraft on carrier: Before & After Recovery of Image Texture

## Applications

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- **Healthcare**  
Medical imaging requiring deblurring techniques to clearly see and identify fine-scale structures
- **Remote Sensing**  
Remote sensing and imagery; and comparative satellite imagery

## Advantages

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- **Real-time fast Fourier transforms (FFT) rendering**  
Uses FFT allowing it produce real-time results

## Abstract

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The present invention relates to a for a singular integral image deblurring comprising a direct procedure for classifying image smoothness and a class of fast, direct methods that recover fine-scale structure using Lipschitz (BESOV) space regularization, singular integrals, and the fast fourier transform.

## Inventors

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## Citations

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1. A. Carasso, Singular Integrals. Image Smoothness, and the Recovery of Texture in Image Deblurring. SIAM Journal of Applied Mathematics. Vol. 64, No. 5 (2004), pp. 1749-1774.

## References

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- U.S. Patent # 7,437,012
- Docket: 03-016/04-002US

## Status of Availability

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This invention is available for licensing.

Last Modified: 07/25/2011